VAX 4000
Dual-Host Systems

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Preface

This manual describes the VAX 4000 series dual-host configurations supported by VAX/VMS version 5.3–2 or later.

For information on how to install or operate your dual-host system, see your system *Operation* or *Installation* manuals.

Intended Audience

This guide is intended for use by Digital customers who are familiar with the individual VAX 4000 systems that form dual-host configurations. The content of this manual is primarily reference information needed to plan configurations of dual-host systems.

Organization

This guide has two chapters, as follows:

Chapter 1 presents an overview of dual hosts and the basic requirements for dual-host configurations.

Chapter 2 gives examples of supported configurations, with diagrams.

Conventions

The following conventions are used in this manual:

Convention	Meaning
NOTE	Provides general information about the current topic.
CAUTION	Provides information to prevent damage to equipment or software.
WARNING	Provides information to prevent personal injury.

Chapter 1

Dual-Host Systems and DSSI

1.1 Introduction to Dual-Host Systems

A dual-host configuration is made up of two Q-bus VAX 4000 systems connected by a Digital Storage Systems Interconnect (DSSI) bus. The two systems share one another's Integrated Storage Elements (ISEs) across this bus. The ISEs can be located within each host, within an expander, or both.

In a dual-host configuration, both systems remain functionally independent. However, the common DSSI storage bus, together with VAXcluster software, creates a unique subsystem that makes all media devices available to both host systems. This provides two data paths for access to all ISEs by either host.

A dual-host system always includes RF-series ISEs, Ethernet, a DSSI storage bus, the VMS operating system, and DECnet and VAXcluster software. A VAX 4000 system can also function as dual host with a Q-bus MicroVAX system.

1.1.1 Higher Disk Availability

Dual-host systems provide higher disk availability for critical applications. A dual-host system can provide automatic failover when used as a server for satellites in a VAXcluster system. In this instance, the application runs on the satellite. As such, the dual-host system increases your ability to access data by providing alternate an access path to the running application if one of the host systems fails. The user sees a pause in the application. Then, following the cluster state transition, the application resumes on the other host with no user intervention.

When an application is running on one of the dual hosts, and that host system fails, the user has to restart the application on the second host system.

1.1.2 Minimized Downtime

In a timesharing environment, a dual-host system minimizes downtime. If one host fails, a user on that host simply logs in to the second host and restarts the job, or does an edit/recover routine. The second host in the configuration assumes responsibility for the application and lets the user access data on the storage devices connected to the DSSI storage bus. (The same recovery/restart routine is used in CI VAXclusters.)

Using a dual-host system for a boot server can help eliminate the risk of cluster downtime if a single host cannot be booted. Dual hosts create two paths to disk storage, ensuring that the VAXcluster users have automatic failover to another system if one of the boot servers fails. A dual-host configuration provides high system and data availability, and maintains the VAXcluster.

Other advantages of a dual-host configuration include the following:

- Automatic failover when an application is running on the satellite node
- Higher availability to data for satellites and timesharing users
- Read/write file sharing down to the record level
- Resource sharing through distributed batch and print queues
- Data and resource sharing through a distributed file system
- Centralized system management and security
- Ability to run any VMS application
- Growth path from a single VAX 4000 or MicroVAX system
- Greater performance and more I/O than with a single-host system

1.2 Dual-Host Components

Basic dual-host components are the RF-series ISEs, the storage expander, and the DSSI cable.

1.2.1 RF-Series Integrated Storage Elements

RF-series ISEs are:

RF30 (150 Mbytes)
RF31 (380 Mbytes)
RF71 (400 Mbytes)

The ISE has a disk controller on board the physical drive. The ISE receives a complete packet of information requesting a task to be done. The intelligent on-board controller interprets the packet and performs the task without any further communication from other DSSI nodes. At this point, the ISE begins doing the intelligent tasks of reading, writing, collecting status, and so forth.

The intelligence of the ISE extends beyond reading and writing. The intelligent on-board controller can provide detailed status of the ISE, or start and monitor an internal diagnostic of the ISE.

1.2.2 R400X Expander

The R400X expander provides a VAX 4000 system with additional ISEs. This DSSI expander has the following specifications for use in a dual-host configuration:

- One expander per DSSI bus
- Can be used with systems not based on DSSI by adding KFQSA
- Holds up to seven ISEs

1.2.3 External DSSI Cables

One external DSSI cable is required for each connection between systems; two cables are required to connect two systems and an expander.

External cables connect DSSI storage devices and adapters. The DSSI external cable, part number BC21M–09, is included with a factory-configured dual-host configuration, as well as with expansion boxes. If your system was not factory-configured, you must order additional cables separately.

1.3 DSSI Storage Bus and Adapters

Each DSSI storage bus consists of a maximum of eight nodes, two of which may be adapters and six of which may be ISEs.

Embedded DSSI adapters (EDAs) are the interface between a CPU host and the DSSI storage bus, connecting the CPU and the intelligent controllers within each ISE. Once the initialization and device configurations are complete, the DSSI adapter becomes a passive protocol interpreter, leaving the communications control to the host CPU and the intelligent controller on each ISE.

Two basic DSSI adapter designs are in use for dual-host configurations: the EDA and the KFQSA.

1.3.1 Embedded DSSI Adapter

The primary adapter design involves DSSI interface logic embedded on the CPU module. This design is the called the Embedded DSSI Adapter (EDA).

A KFQSA module may be installed in a system that contains an EDA.

1.3.2 KFQSA

The KFQSA is a standard Q-bus option module that may be added to a VAX 4000 system to increase the number of DSSI storage busses connected to that system. See Table 1–1 for an explanation of KFQSA suffixes. Each KFQSA module adds one additional DSSI storage bus to the system.

When linked to a MicroVAX in a dual-host configuration, the VAX 4000 may have as its co-host a system that uses a KFQSA module.

Table 1–1: KFQSA Suffixes

Suffix	Description	Where Needed
–SA	KFQSA Q-bus to DSSI adapter, factory installed in BA213 enclosure	For MicroVAX 3800 only; cannot be ordered separately
–SE	Additional KFQSA Q-bus to DSSI adapter, factory installed	When new MicroVAX 3300, 3400, or 3800 needs second DSSI adapter, or when VAX 4000 needs additional DSSI adapter
–SG	KFQSA adapter, field installed	For existing MicroVAX 3600 or 3900 that requires its first DSSI adapter, or for existing MicroVAX 3300, 3400, or 3800 that requires second DSSI adapter, or VAX 4000 needing additional DSSI adapter
–AA	KFQSA Q-bus to DSSI adapter, field installed in BA23 or H9642 enclosure	For existing MicroVAX II in BA23 or H9642 cabinet that requires DSSI adapter
–BA	KFQSA Q-bus to DSSI adapter, field installed in BA123 enclosure	For existing MicroVAX II in BA123 enclosure that requires DSSI adapter

1.4 Configuration Rules for Dual-Host Systems

The following rules are required for a dual-host configuration:

1. Two VAX 4000 systems, or one Q-bus MicroVAX and one VAX 4000.
2. Software licenses shown in Table 1–2.
3. DSSI adapters (KFQSA module and/or embedded adapters). See Table 1–3 and Table 1–4.

4. Ethernet hardware.
5. Maximum of six ISEs on each DSSI bus.
6. Maximum of two system enclosures and one expander per DSSI storage bus.

Table 1–2: System Software Licenses

First System	Second System
VMS	VMS
VAXcluster	VAXcluster
DECnet full-function	DECnet end-node

All systems used in dual-host configurations must have DSSI storage adapters, whether they are embedded on the system module or connected to the Q-bus by means of a KFQSA module. Table 1–3 and Table 1–4 show what type of adapter each system uses.

Table 1–3: VAX 4000 and MicroVAX Systems With Internal DSSI

System	Adapter
VAX 4000 Model 300	EDA (2)
VAX 4000 Model 200	EDA (1)
MicroVAX 3300	EDA
MicroVAX 3400	EDA
MicroVAX 3800	KFQSA

Table 1–4: MicroVAX Systems Without Internal DSSI

System	Adapter Requirements
MicroVAX II	KFQSA–AA or KFQSA–BA
MicroVAX 3500	KFQSA–SG
MicroVAX 3600	KFQSA–SG
MicroVAX 3900	KFQSA–SG

1.5 Sample Configurations

Chapter 2 shows different ways to use VAX 4000 systems in dual-host configurations. As shown in Figure 2–9 and other diagrams, previously purchased MicroVAX systems can be upgraded to dual-host configurations with VAX 4000 systems.

1.6 Software Levels and Dual-Host Configurations

As shown in Table 1–5, you must have VMS version 5.3–2 or greater to use VAX 4000 systems in dual-host configurations.

Software requirements also include DECnet and VAXcluster software.

Table 1–5: VMS Versions, Adapters, and Restrictions

VMS Version	EDA in Systems or KFQSA	Adapter Restrictions
5.3–2 or later	VAX 4000 to VAX 4000 VAX 4000 to MicroVAX 3300 /3400 VAX 4000 to KFQSA	Mixed adapters allowed Dual DSSI/dual host allowed

1.7 Module Order

The order of modules for individual systems in a dual-host configuration is the same as for single-host configurations.

1.8 System Disk

A dual-host configuration may be run using one system disk. Since expanders fail less often than systems, Digital recommends that, when possible, you locate the system disk in an expander.

Chapter 2
Supported VAX 4000 Dual-Host Configurations

This chapter contains diagrams illustrating eleven supported VAX 4000 dual-host configurations. The configurations are captioned to indicate the enclosures shown: BA440, BA430, or BA215.

Table 2–1: VAX 4000 Enclosures and Their DSSI Capabilities

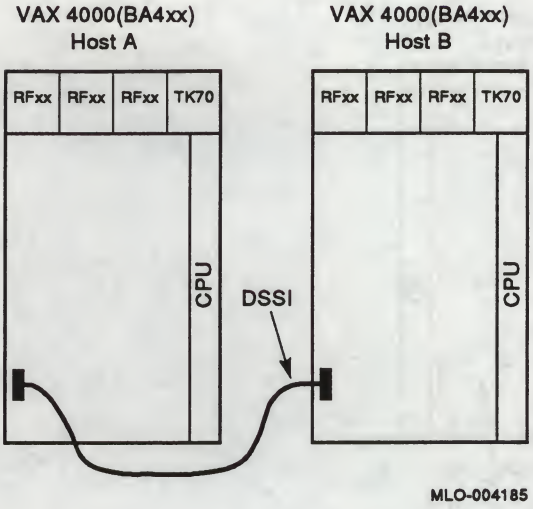
Enclosure	VAX 4000 Model	Embedded DSSI Busses	KFQSA Slots
BA440	300	2	2
BA430	200	1	2
BA215	200	1	2

The diagrams in this chapter are as follows:

- Figure 2–1: Dual VAX 4000 Model 200 (BA430) hosts
- Figure 2–2: Dual VAX 4000 Model 300 (BA440) as dual DSSI/dual hosts
- Figure 2–3: Dual VAX 4000 Model 200 (BA215) hosts
- Figure 2–4: Dual VAX 4000 Model 200 (BA215) hosts and either Model 200 (BA430) or Model 300 (BA440))
- Figure 2–5: Dual VAX 4000 Model 200 (BA430) hosts sharing an expander
- Figure 2–6: Dual VAX 4000 Model 200 (BA215) hosts sharing an expander
- Figure 2–7: Dual VAX 4000 Model 300 (BA440) as dual DSSI/dual hosts sharing an expander
- Figure 2–8: Dual VAX 4000 Model 300 (BA440) as dual DSSI/dual hosts sharing two expanders

- Figure 2–9: VAX 4000 Model 300 (BA440) and MicroVAX 3800 sharing an expander
- Figure 2–10: VAX 4000 Model 200 (BA215) and MicroVAX 3800 dual hosts
- Figure 2–11: VAX 4000 Model 200 (BA215) and MicroVAX 3300/3400 dual hosts

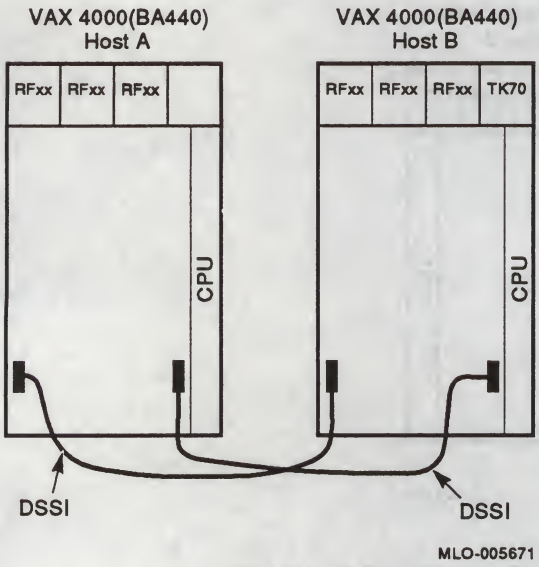
Figure 2–1: Dual VAX 4000 Model 200 (BA430) Hosts



In Figure 2–1, ISEs are located in the system enclosures.

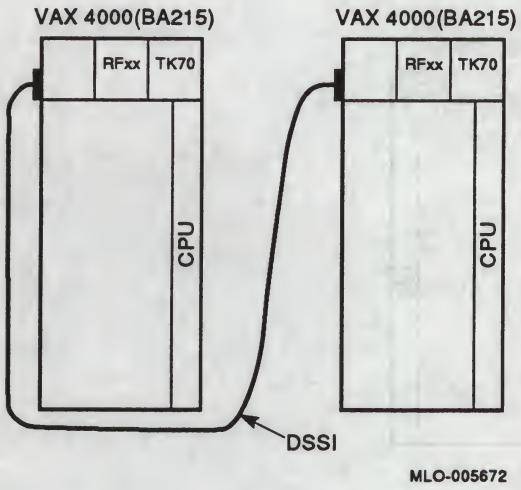
The embedded DSSI bus is used by each host to share the six internal ISEs.

Figure 2–2: Dual VAX 4000 Model 300 (BA440) as Dual DSSI/Dual Hosts



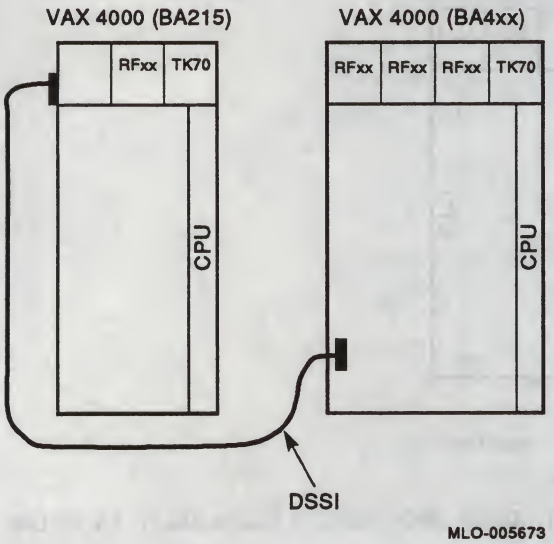
In Figure 2–2, one DSSI bus (cable running from far left of Host A to far left of Host B) shares the ISEs installed on the two systems. The other DSSI bus can be used for communications.

Figure 2–3: Dual VAX 4000 Model 200 (BA215) Hosts



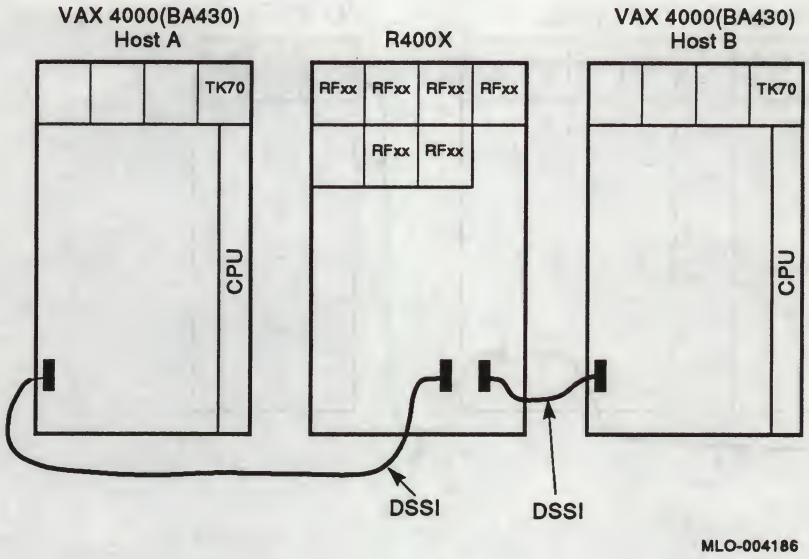
In Figure 2–3, two VAX 4000 Model 200 (BA215) hosts share their two ISEs.

Figure 2–4: Dual VAX 4000 Hosts Model 200 (BA215) and Either Model 200 (BA430) or Model 300 (BA440)



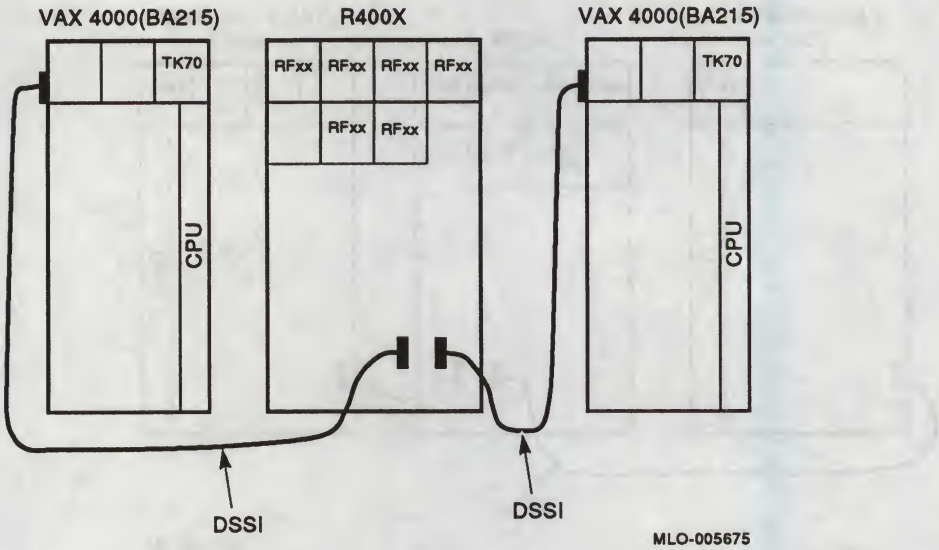
In Figure 2–4, a BA215 and a BA4xx share four ISEs.

Figure 2–5: Dual VAX 4000 Model 200 (BA430) Hosts Sharing an Expander



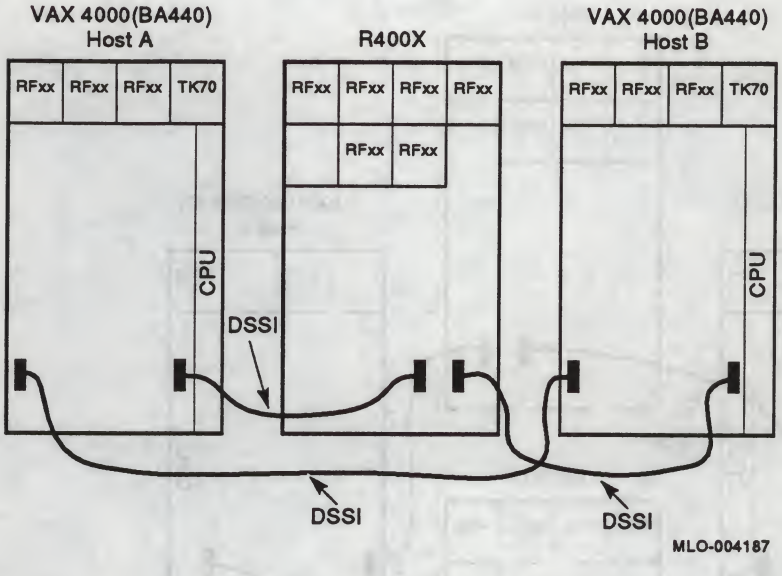
In Figure 2–5, two BA430s share the six ISEs in the expander.

Figure 2–6: Dual VAX 4000 Model 200 (BA215) Hosts Sharing an Expander



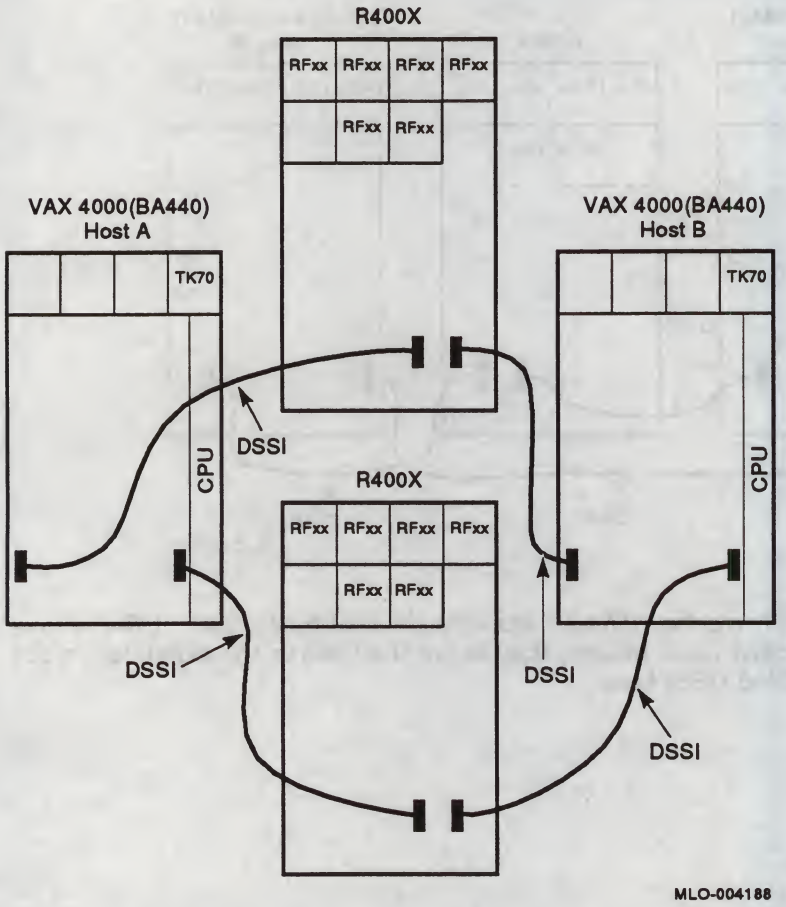
In Figure 2–6, two VAX 4000 Model 200 (BA215) hosts share an expander that contains all the ISEs.

Figure 2–7: Dual VAX 4000 Model 300 (BA440) as Dual DSSI/Dual Hosts Sharing an Expander



In Figure 2–7, the two BA440s share their combined system ISEs on one of the embedded DSSI busses; they share the ISEs in the expander on the other embedded DSSI bus.

Figure 2–8: Dual VAX 4000 Model 300 (BA440) as Dual DSSI/Dual Hosts Sharing Two Expanders



In Figure 2–8, the two BA440s are connected by means of each of the two embedded DSSI busses to a separate, shared expander.

Figure 2–9: VAX 4000 Model 300 (BA440) and MicroVAX 3800 Hosts Sharing an Expander

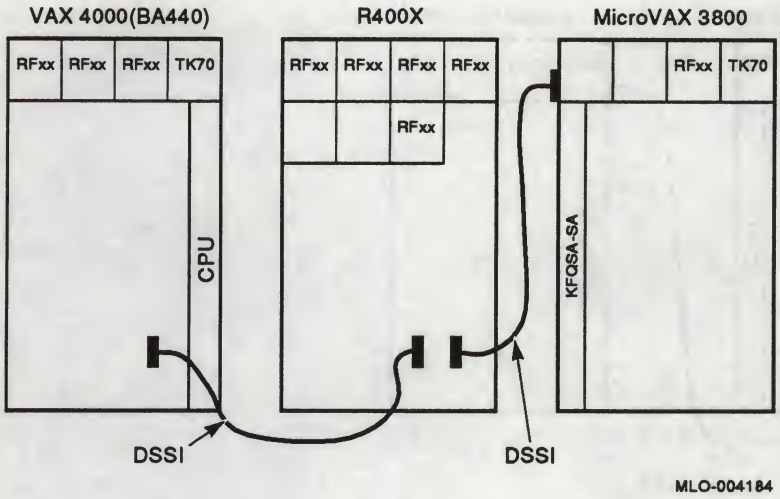


Figure 2–9 illustrates the VAX 4000 Model 300 (BA440) as a dual host with a MicroVAX 3800. The KFQSA module in the MicroVAX 3800 interfaces to the DSSI storage bus, allowing it to share the ISEs in the expander. The VAX 4000 interfaces to the DSSI storage bus by means of an embedded DSSI adapter.

The three RF-series ISEs in the BA440 enclosure are not dual-hosted but they are available by means of the cluster server.

The MicroVAX host in this configuration is factory configured and contains one ISE.

Figure 2–10: VAX 4000 Model 200 (BA215) and MicroVAX 3800 Dual Hosts

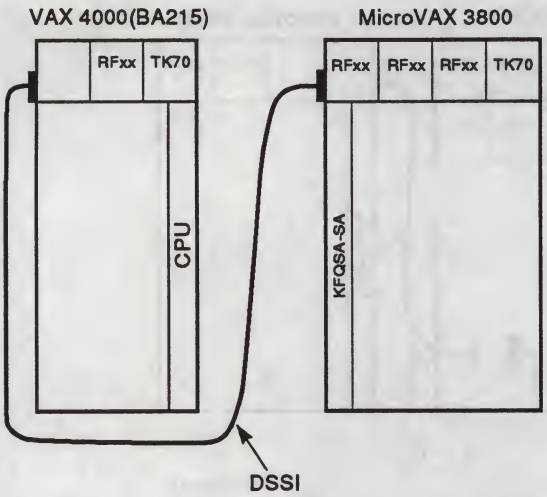
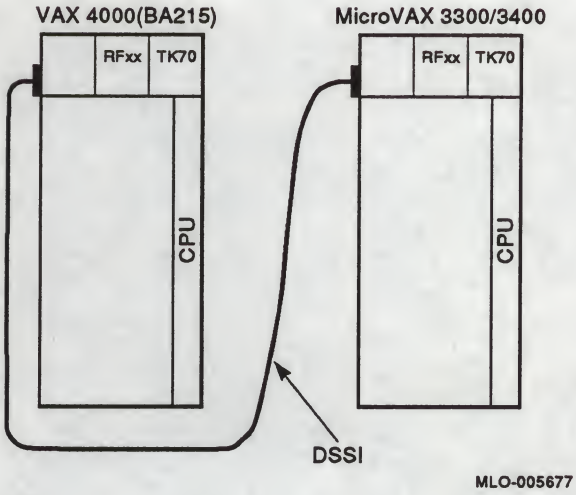


Figure 2–10 illustrates a dual-host configuration that includes a VAX 4000 Model 200 (BA215) and a MicroVAX 3800 with a total of four ISEs, all internal to the hosts.

Figure 2–11: VAX 4000 Model 200 (BA215) and MicroVAX 3300/3400 Dual Hosts



In Figure 2–11, a VAX 4000 Model 200 (BA215) combines with a MicroVAX 3300/3400 to share the two ISEs within the two systems.

Appendix A
Related Documentation

The following documents contain information related to the concepts and hardware maintenance of dual-host system configurations.

Document Title	Order Number
KFQSA Installation and User Guide	EK–KFQSA–IN
RF71 User Guide	EK–RF71E–UG

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